benzol used was measured in the same way; by subtracting this from the contaminating effect of the solution I got the effect of the oil or other substance purposely dissolved.

Thus with three solutions of Provence oil of equal concentration I got the length of the surface rendered anomalous by the oil contained in four drops:—

Solution I., 8·3cm.; Sol. II., 7·8cm.; Sol. III., 7·7cm.

For the sake of verification the other method, viz., counting the drops required for making the whole surface of the trough anomalous, was also employed. By this course the effect of four drops was obtained as follows:—

Solution I., 8·0cm.; Sol. II., 7·9cm.; Sol. III., 7·7cm.

The close agreement of the two methods proves that the strip of plate, simply laid across the trough, is sufficient to separate normal surfaces.

Another trial with an *ethereal* solution of olive-oil gave 7·1cm., if the somewhat different size of the drops be regarded; but I preferred benzine, because its original contamination was in most cases only between 1·3cm. and 2·5cm., whilst that of ether amounted to 4 to 6cm.

The mean of the lengths got by the three solutions was 7·9cm., and by this combined with the width of the trough = 5·8cm., we obtain the area of the surface made anomalous by 1mg. of Provence oil:

$$\frac{7{\cdot}9 . 5{\cdot}8}{4 . 0{\cdot}001354} = 8460 \text{ qcm.}$$

or a density of 0·000118mg. per qmm. at the beginning of the anomalous state.

In the following table are collected the results obtained with different substances:—

Substance.	qcm. per mg.	mg. per qcm.
Provence oil	8460	0·000118
Ordinary olive oil	8565	0·000117
Oleine [1]	8137	0·000123
Rape-seed oil	7388	0·000135
Poppy oil	8994	0·000111
Tallow	9636	0·000104
Spermaceti	5568	0·000179
Stearic acid	4711	0·000212
Resin (colophony)	8105	0·000123
Turpentine oil (clear)	107	0·009346
Turpentine oil (older)	2944	0·000339

The table shows next that the mass required for lowering the tension is not the same with different substances, and on the other hand it affords an interesting comparison between fluid and solid bodies. If the cause of the lowered tension be a film of greasy fluid spread over the surface, the contaminating effect of solid bodies can only be explained by small quantities of such fluids present on the surface or in the interior of the solid. This may be so in many cases, but the effect of stearic acid and spermaceti is such as if more than half their weight consisted of oil. The strong effect of colophony, although this did not dissolve entirely in benzine, and the result that tallow acts more strongly than an equal weight of oleine, its fluid component, also appear to me very remarkable.

After this it seems to me very probable that the contaminating substances *are not spread in coherent films at all*, but rather in a state of very fine distribution between the superficial water-molecules, that must be named either *emulsion* or *solution*.

However, only certain organic substances seem to be capable of forming surface-solutions of this kind, whilst the effect of metals and salts, formerly observed by me, was due to incomplete cleanness of the bodies, as later researches have proven.

Finally I will add some remarks on the thickness of the hypothetical oil-films. The thickness calculated from my observations with olive oil is at the beginning of the anomalous state 1·3 $\mu\mu$. In order to derive from this number the thickness at any other condition of the surface, it needs only to be multiplied with the relative contamination corresponding to that condition, that is, with the ratio of the surfaces. So we get at the smallest relative contamination measurable in my apparatus = $\frac{1}{35}$ a thickness of the film = 37.10^{-3} $\mu\mu$.

For measuring the relative contamination in the anomalous state, a special mode of procedure was required on account of the imperfect separation of surfaces by the partition. For that purpose I put on the surface that is to be contracted a [-shaped swimming wire, a little shorter than the width of the trough, and by the situation of this mark, following exactly every movement of the surface, I measured the relative length of the latter, instead of reading it from the partition itself.

The ratio in which the surface must be contracted in order to arrive at the tension at which camphor comes to rest, was very different with various substances, for an instance with stearic acid = $\frac{5}{3}$, oleine = $\frac{18}{11}$, ordinary olive oil = 5, and with Provence oil the tension in question could not be reached at all, except when the oil was standing on the water in visible drops or films. The calculated thickness of the film at the stopping of camphor movements would be with oleïn = 2·13$\mu\mu$, ordinary olive oil = 6·5$\mu\mu$, and with Provence oil still greater, if this liquid were spread equally. A very precise specification of the sort of oil used therefore appears to be necessary, if observations concerning this point are to be compared.

AGNES POCKELS.

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[1] A brown-looking liquid sold under this name in the drug stores.

NOTES.

THE Federated Institution of Mining Engineers will hold its annual general meeting in North Staffordshire on Wednesday, September 7, in the large hall of the First Shropshire and Staffordshire Artillery Volunteers, Shelton. Both on that and on the following day visits will be made to various works and places of interest.

THE Committee appointed to consider whether a national aquarium should be established in Sydney have presented a full and interesting report to Mr. F. B. Sutton, the New South Wales Minister for Public Instruction. They strongly recommend that "a commodious building of a substantial and not unsightly character" should be erected, to contain a large series of tanks constituting the public aquarium, with experimental tanks for researches on fish-breeding, &c., in connection with the fisheries of the colony, and laboratories for scientific investigation. It is calculated that the "initial cost" would be about £10,000, and that an annual amount of about £1200 would be needed for salaries and for purchases, repairs, and other incidental expenses.

IN response to an invitation from President G. Stanley Hall, of Clark University, a number of psychologists met from various institutions at that University, Worcester, Massachusetts, on July 8, for the purpose of forming an American Psychological Association. Prof. G. S. Fullerton, of the University of Pennsylvania, presided. After some general discussion on the form of organization the entire matter was referred to a committee. Sessions were held in the afternoon and evening, at which papers were read by Profs. Jastrow, Sanford, and Bryan, and Doctors Nichols, Krohn, and Gilman. It was decided in response to an invitation from Prof. Fullerton to hold the next meeting of the Association in Philadelphia, at the University of Pennsylvania, on Tuesday, December 27. Prof. Jastrow was appointed secretary to provide a programme for that meeting. He asked the co-operation of all members of the Association for the section of psychology at the Chicago Exhibition, and invited correspondence on the subject.

DR. VON LENDENFELD, at one time assistant to Prof. Lankester at University College, Gower Street, has been appointed to the chair of zoology at the University of Czernowitz, rendered vacant by the death of Prof. V. Graber.

PROF. DR. CHARLES BERG has become director of the National Museum at Buenos Ayres, in the place of Prof. Dr. Hermann Burmeister.

THE Council of the Institution of Civil Engineers has issued a list of subjects on which it invites original communications. The list, it is explained, is to be taken merely as suggestive, not in any sense as exhaustive. The Council points out that it has power to award to the authors of papers premiums arising out of special funds bequeathed for the purpose. No award will be made unless a communication of adequate merit is received, but more than one premium will be given if there are several deserving memoirs on the same subject.

THE twenty-third session of the German Anthropological Congress, which was held at Ulm early in August, was in every way most successful. At the first meeting one of the most prominent speakers was Prof. Ranke, who spoke of the need for a German National Museum. He recognized the value of the museums at Mainz and Nürnberg, but urged that a genuinely national institution ought to be established, and that the proper place for it is Berlin. At this meeting an interesting discussion on the so-called Kannstadt race was opened by Dr. von Hölder. The opinion of the meeting was that the characteristics of the famous Kannstadt skull are found in some persons of the present day, and that the skull is not one that has come down to us from prehistoric times. Prof. Virchow, who took part in the discussion, uttered a general warning as to the necessity for caution in attributing high antiquity to human remains. On the following day a paper on the anthropological position of the Jews was read by Dr. von Luschau. His main points were that the Jews are a mixed race, and that in some of their physical peculiarities (such as the form of the nose) they resemble the Armenians more closely than any people of purely Semitic origin. Prof. Kollmann dealt with the question of the origin of the European peoples, and Prof. Virchow spoke of the fact that the traveller Vaughan Stevens has found in the interior of Malacca a genuine Negrito stock, and has sent skulls and specimens of hair. At the third meeting one of the best papers was by Dr. Boas, on the organization of anthropological research in North America. It was decided at this meeting that the next session of the Congress would be held at Hanover in 1893. Scientific excursions were made to Blaubeuren and Schussenried, where traces of lake dwellings have been discovered, and to Sigmaringen and Schaffhausen.

THE causes of the St. Gervais disaster are being gradually elucidated. A very interesting paper describing a visit to the small Téte-Rousse Glacier is contributed to *La Nature* (August 20) by M. Vallot, director of the new Mont Blanc Observatory. At the end of the glacier, on a steep face of rock, he and M. Delebuque found an enormous arching cavity, filled recently (it would appear) with ice which had been shot out by some internal force. They entered the cavern, and observed traces of an interior lake. A passage, strewn and overhung with blocks of ice, led up to an open space, a sort of huge crater, with walls of white ice, absolutely vertical. It was about 270 feet long, and 133 feet broad and deep. M. Vallot and his friend returned by the way they entered, and examined this crater from above. Their opinion is that a lake had been formed at the bottom of the glacier, and the crater, gradually accumulating through obstruction of the orifice of outflow, had undermined the ice-crust over the upper cavity. This at length collapsed, exerting enormous pressure on the water, which pressure, transmitted to the lower grotto, burst the glacier, throwing out the anterior part on the steep rocky slope. Thus is explained the enormous quantity of water precipitated into the valley, carrying in its passage the soil of the banks, and forming a torrent of liquid mud mixed with ice blocks and rocks. M. Vallot estimates that about 100,000 cubic metres of water and 90,000 of ice issued from the glacier. On reaching the Baths the torrent may have been 300,000 cubic metres. He supposes that the sub-glacial lake may form again, and the remedy would be to blast the rocky bottom so as to provide an escape for the water; a work which should be done speedily to be of use.

THE weather has been very unsettled during the past week, several low-pressure systems having passed over our islands from the westward, accompanied by very heavy rain, especially in the southern, northern, and western parts of the country. Between mid-day of Saturday and Sunday 1¾ inches fell in the south, being about three-fourths of the average fall for the month of August, and another heavy downpour occurred in the north and west on Monday night, two inches being measured in the west of Scotland, and 1½ inches at Holyhead. The temperature has fallen considerably since the previous week, the daily maxima rarely exceeding 70° in the southern parts of the country, while in the north and west it has been considerably lower. The wind has reached the force of a gale on the coasts on more than one occasion during the week, and on Tuesday the centre of a rather deep depression lay over Ireland, while the sea was rough on nearly all coasts, the conditions being very threatening, with a prospect of further heavy rains. In southwest England the amount of rainfall from the beginning of the year up the week ending August 27th, was still more than eight inches below the average, and the only district where the amount just exceeded the average was the northern part of Ireland.

THE New England Meteorological Society has issued a volume of Investigations for the year 1890 (reprinted from the Annals of Harvard College Observatory, Vol. xxxi. pt. I., 1892) containing a summary of the observations made at the Society's stations; reports were received from 172 observers during the year, also five-year tables of temperature and precipitation, by J. Warren Smith, with an introduction by W. M. Davis, Director of the Society. The title scarcely explains the real amount of work done, for at some stations there are many periods of five years, *e.g.*, at New Bedford (Mass.) the observations extend over 15 pentades (1816–1890). It has not been possible to keep to the same years in all cases, nor has any attempt yet been made to discuss the data.—The tornado at St. Lawrence (Mass.), of July 26, 1890, by Helen Clayton. This storm caused considerable loss of life and property. The distances between the points where destruction was reported seem to indicate that the destructive winds descended at times to the earth's surface at certain points, and after a short track rose again. Prof. Davis has written a preface to this paper, in which he discusses fully the characteristics of tornados.

THE Annual Report on the Royal Botanic Gardens, Trinidad, for 1891, contains a table showing the monthly and yearly rainfall values for thirty years ending 1891. The average yearly fall for that period was 65·91 inches. Mr. F. H. Hart points out that the rainfall shows a decrease at a seriously rapid rate, for, dividing the period into decades, the first decade shows a total of 7·12 inches more than the second, and the third shows another decrease of 9·56 inches on the second, or 16·68 inches on the first decade. This is a subject of the utmost importance to questions of forestry and water supply. He also points out that the rainfall is not so much affected as is generally supposed by the contiguity of Trinidad to the mainland, but more particularly to the course of the tradewinds which blow towards the continent of South America. It is a curious fact that it always rains at Trinidad with a high barometer. On June 25 last the observer states that it was not daylight until long past the proper hour, the readings at 9h. a.m. having to be taken by candle-light. The rain was heavy and continuous, and was accompanied by the *highest* barometer readings for the year.

"FIFTY Years of York Meteorology, 1841-1890," a paper contributed to the report of the Yorkshire Philosophical Society for 1891, by Mr. J. Edmund Clark, has been issued in pamphlet form.

SOME of the effects of the absence of light upon animal life were strikingly revealed, not long ago, on the reopening of an old mine near Bangor, Cal. In a dry slope connecting two shafts, one of the explorers was astonished to find a number of flies that were perfectly white, except the eyes, which were red; and directly afterwards he killed a pure white rattlesnake. The animals had lived in the dry passages, where they had been supplied with air but not with light. It is supposed that the flies were the offspring of some that had been imprisoned by the partial filling of the mine with water about thirty years ago, and that the snake, when quite young, had been washed down in a rain. A few of the flies were exposed to light in a glass case, and resumed the colours of ordinary house flies within a week.

A WHALING party is being fitted out in America for the purpose of obtaining a live whale for exhibition in the Fisheries department at the World's Fair at Chicago. If captured the whale will be confined in a tank and towed to Chicago by the way of the St. Lawrence river.

IT would appear that naphtha is poisoning the Volga, doing great injury to the fishing industry. Dr. Grimm says (*Messager des Pêcheries*) that the quantity of naphtha conveyed on the river rose from some 32 million kilogrammes in 1887 to nearly 50 millions in 1889. Most of this is carried in badly-made wooden barges, and there is a great deal of leakage into the river, about 3 per cent. on an average (it is estimated). Thus in the three years, 1887 to 1890, the Volga must have absorbed some three million kilogrammes of naphtha, without reckoning petroleum, of which there is a considerable (though less) leakage. Everywhere the fish are decreasing, and they quite disappear at places where boats stop. On the other hand, various fishes—the starlet of Astrachan, *e.g.*—living in the infected water, get a flavour of naphtha, and are no longer eatable. The naphtha also kills the infusoria, insects, flies, mosquitoes, &c., which serve as food for the fishes. In its spring floods the river spreads naphtha over the meadows, destroying the larvæ of those organisms. The thin layer of naphtha on the water hinders the larvæ from breathing. Further, the naphtha injures the vegetation in the meadows. Naphtha is found in such quantities on the land as to suffice for domestic use to the natives, who collect it. Dr. Grimm urges the necessity of taking steps to prevent the ruin of the Volga fisheries.

AMONG the most interesting Echinoderms collected by the United States Fish Commission steamer *Albatross*, on her voyage from New York to San Francisco, was a stalked Crinoid, which is described in No. 2, vol. xvii., of the Memoirs of the Museum of Comparative Zoology at Harvard College (January 1892). The material, consisting of portions of three specimens, was dredged in 392 fathoms off Indefatigable Island, one of the Galapagos group. During the last dredging trip of the *Albatross* an additional specimen was obtained off Mariato Point, in 782 fathoms. When this last specimen was taken out of the water it was of a brilliant lemon colour, with a greenish tinge on the sides of the arms and along the food furrows of the ventral surface. A coloured sketch of it is given from a drawing made on the spot by Mr. Westergren. Its base of attachment came up with a fragment of stem nearly 14 inches long. At the first glance Prof. Agassiz was inclined to regard it as a modern representative of Apiocrinus, but a more careful examination showed so many points of difference that he had to establish the new genus Calamocrinus for its reception, and it stands as *C. Diomedæ*. It is most closely allied to a large group of Mesozoic Crinoids, and it assists in making clear many points in their morphology. This genus has the orals greatly reduced, much as in Bathycrinus. It also possesses heavy perisomic plates, passing gradually into still stouter so-called interradial plates, in Calamocrinus, in no wise to be distinguished from the true interradials of Palæozoic Crinoids. Another structural feature is the limitation of the articular facet to the middle of the radial. This is an eminently embryonic character, and there are traces of it in some of the forms of Millericrinus described by De Loriol in his Jurassic Crinoids, especially in *M. milleri*. After a very detailed and masterly description of the stem, calyx, and arms of the species, Prof. Agassiz discusses the subject of the "Apical System of the Echinoderms," and "Of some of the Homologies of the Echinoderms." Thirty-two plates, some coloured, accompany this Memoir, which is inscribed as follows: "From the time the Crinoids which form the subject of this Memoir came into my hands, I have been in constant correspondence with my late friend, Philip Herbert Carpenter, regarding the many points of interest suggested by their discovery. I can now only have the melancholy satisfaction of inscribing to his memory a Monograph which I had hoped to dedicate to him as an expression of my admiration for his researches in a field where we had long been fellow workers."

M. DE LAPOUGE calls attention, in *La Nature*, to an interesting object he has found in one of a number of ancient graves he has been excavating at Gignac (Hérault). It is a finely-carved head of jade, representing a type of the yellow race. It evidently formed part of a statuette of a religious character, and the style shows that it must have come either from China or Japan. M. Sindhô is of opinion that the statuette was probably made in Japan a little before the Christian era, from a Hindu or Sinhalese model of Buddha. M. de Milloué thinks the head is that of Kouan Yin, a Chinese divinity, while M. de Rosny and M. Motoyosi attribute it to Mayadêvi, the mother of the founder of Buddhism. Whatever the object may be, M. de Lapouge is inclined to believe that it hung as an amulet around the neck of a Hun or Goth, and that the graves at Gignac belong to a cemetery of a West Gothic colony.

A VALUABLE essay on the Ainos of Yezo, by Mr. Romyn Hitchcock, is included in the report of the U.S. Museum for 1890, and has just been issued separately. It is based mainly on the author's personal observations. He has much that is interesting to say on the various aspects of the life of the Ainos, and his remarks are admirably illustrated. Mr. Hitchcock notes the remarkable fact that the Ainos have been very little influenced by the civilization of the Japanese, with whom they have so long been in close contiguity. The Aino, he says, has not so much as learned to make a reputable bow and arrow. Unable to affiliate with the Japanese, the Ainos "remain distinct and apart," and for that reason, in Mr. Hitchcock's opinion, are "doomed to extinction from the face of the earth."

THE second volume of Mr. J. Walter Fewkes's "Journal of American Ethnology and Archæology," has just been issued. The most important article in the first volume was an interesting account, by Mr. Fewkes, of "a few summer ceremonials at Zuñi Pueblo." The greater part of the second volume is devoted to a description, by the same writer of "a few summer ceremonials at the Tusayan Pueblos." Mr. Fewkes and his assistant, Mr. J. G. Owens, were admitted as priests by the Tusayans, so that the paper contains many details which have not hitherto been accessible to students. Mr. Fewkes also presents a report on the present condition of a ruin in Arizona called Casa Grande, and Mr. Owens describes various natal ceremonies of the Hopi Indians.

THE new number of the *Internationales Archiv für Ethnographie* (Band V., Heft 3) opens with a paper, in French, by M. G. van Vloten, on the flags used at Teheran in connection with the festival in memory of the martyrdom of the Imâm Huçeïn. M. Désiré Pector contributes (also in French) some observations suggested to him by the reading of a work by M. de Montessus on Pre-Columbian Salvador. Herr F. Grabowsky writes (in German) on the theogeny of the Dayaks.

THE following are the subjects of papers in the current number of the *Mineralogical Magazine*:—Minerals from the apatite-bearing veins at Noerestad, near Risör, on the south-east coast of Norway, by R. H. Solly (with a note on their occurrence, by A. L. Collins); on the pinite of Breage in Cornwall, by J. H. Collins; danalite from Cornwall, by H. A. Miers and G. T. Prior; mineralogical notes from Torreon, State of Chihuahua, Mexico, by Henry F. Collins; note on crystals of manganite from Harzgerode, by Frank Rutley; analysis of aragonite from Shetland, by J. Stuart Thomson; orpiment, by H. A. Miers. There are also reviews and abstracts; and Mr. Miers and Mr. Prior contribute a valuable index to mineralogical and petrographical papers, 1888.

WE have received from the Geological and Natural History Survey of Canada, Part 4 of "Contributions to Canadian Micro-Palæontology." The report consists of descriptions and illustrations of thirteen new and three previously known species of Radiolaria, collected by officers of the survey from the upper cretaceous rocks of North Western Manitoba, and has been prepared for publication by Dr. D. Rüst, of Hanover. Mr. Tyrrell, geologist in charge of the explorations in Manitoba, contributes a short introduction to the report.

BULLETIN No. 11 of the Imperial University College of Agriculture, Komaba, Tōkyō, has recently been published. It consists of the report of Dr. O. Kellner on the third year's "Manuring Experiments with Paddy Rice."

AMONG the contents of the June number of *Temehri*, the Journal of the Royal Agricultural and Commercial Society of New Guinea, are papers on "Twenty Years' Improvements in Demerara Sugar Production" (Part 2), "The Bats of British Guiana," "Guiana Gold," and "Our Birds of Prey." The number also contains many short notes of an interesting nature.

MR. S. GARMAN publishes a treatise on the fishes of the families Cyclopteridæ, Liparopsidæ, and Liparididæ, in the Memoirs of the Museum of Comparative Zoology at Harvard College (Vol. xiv., No. 2, April 1892). Though several of the rarer forms of Discoboli are not represented in the collections of the Harvard Museum, yet it possesses so many duplicates of several species, in addition to rare and some undescribed types of others, that it presented great facilities for a study of the group, of which Mr. Garman has well availed himself. Prof. F. W. Putnam had at one time intended to write a history of the group, and many drawings had been some years ago prepared for it by Mr. Roetter; these drawings have been utilized in the present memoir, and the work has been made more complete by the drawings of the young stages of several of the species, contributed by Prof. A. Agassiz. After a short introduction there is a history of the distribution of the species, followed by one on the history of the genera from the times of Pliny, Gesner, and others, and then a description of the recognized genera and species, of which the following is a summary. *Cyclopterus lumpus*, Linn.; *Eumicrotremus spinosus*, Mull.; *E. orbis*, Gthr.; *Cyclopteroides gyrinops*, gen. et spec. nov. (St. Paul's Island, Alaska); *Cyclopterichthys ventricosus*, Pall.; *C. amissus*, Vaill.; *Liparops*, gen. nov. established for *Cyclopterus stelleri*, Pall.; *Liparis montagui*, Don.; *L. mucosus*, Ayr.; *L. calliodon*, Pall.; *L. liparis*, Linn.; *L. antarctica*, Put.; *L. agassizii*, Put.; *L. tunicatus*, Reinh.: *L. steineni*, Fisch.; *L. pulchellus*, Ayr.; *L. pallidus*, Vaill.; *Careproctus micropus*, Gthr.; *C. major*, Fabr.; *C. gelatinosus*, Pall., *C. reinhardi*, Kroy.; *Paraliparis rosaceus*, Gilb.; *P. bathybius*, Col.; *P. liparinus*, Goode; and *P. membranaceus* Gthr. *Careproctus longifilis*, spec. nov., and *Paraliparis fimbriatus*, spec. nov., are also indicated, but will be described at length in the forthcoming report of the "U. S. Fishery Commission."

SOME experiments have recently been made at the New York Agricultural Experiment Station upon the possible effect of long-continued applications of a copper sulphate spray used as a fungicide (Bulletin 41). Two soil mixtures were used, one containing 5 per cent. and the other 2 per cent. of copper sulphate. These quantities are comparatively so enormous that useful practical conclusions cannot yet be drawn, though some of the results have proved interesting. Seeds of plants representing widely differing natural orders were planted in these soils, and at the same time an equal number of the same kinds of seeds were planted for checks in similar soil to which no copper sulphate was added. Care was taken to select good seed, and to give the soil mixtures, and checks exactly similar conditions and treatment. In the soils containing sulphate of copper more seeds germinated in almost every case than in the soils containing no copper. The average length of time required for germination was greatest in the copper soils. The foliage of plants grown in the copper soils was of a deeper green and darker with the 5 per cent. soil mixture than with the 2 per cent. one, but although darker the leaves were smaller and the height of the plants and the yield of fruit very much less than in the case of plants grown under normal conditions. Peas grown in the 2 per cent. soil mixture seemed to be more vigorous for the first few weeks than the check plants grown in untreated soil; they also came to maturity earlier, but finally showed a dwarfed appearance, and the yield was less than with the check plants, being little more than one-half the yield under normal conditions. In the 5 per cent. soil mixture peas gave a yield only one-seventh of that from untreated soil. In the case of all plants grown in the soil mixtures the roots were very small and ill-developed. Analysis of the tops of tomatoes grown in the 5 per cent. soil showed in the air-dried substance ·06 per cent. of copper, proving conclusively that these plants can take up sulphate of copper by their roots. Analyses were made of berries and stems from vines which had been sprayed with copper compounds, and although the amount of copper found upon the stems varied, that found on the grapes was practically constant, and amounted to 1/120th of a grain per pound of grapes, this quantity being considered quite negligeable and harmless.

THE additions to the Zoological Society's Gardens during the past week include two Rhesus Monkeys ♂ ♀ (*Macacus rhesus*) from India, presented by Mr. J. Hall-Browne and Mr. Rivers respectively; four Virginian Foxes (*Canis virginianus*) from California, presented by Mr. Edward Chauvenet Holden; two Ogilby's Rat Kangaroos (*Hypsiprymnus ogilbyi*) from Australia, presented by Mr. John W. Roche; a Ruffed Lemur (*Lemur varius*) from Madagascar, deposited by Captain Marshall, F.Z.S.; three Tigers ♂ ♀ ♀ (*Felis tigris*) from India, deposited by Messrs. William Watson and Co.; a Blue and Yellow Macaw (*Ara avarauna*) from South America, presented by Mr. R. Larchin; ten Spanish Blue Magpies (*Cyanopolius cooki*), and two Ravens (*Corvus corax*) from Spain, deposited by Lord Lilford, F.Z.S.; two Fringed Chameleons (*Chamæleon tænio-bronchus*) and a Lobed Chameleon (*Chamæleon parvilobus*) from Natal, presented by Mr. Charles W. Heaton; a Black Iguana (*Metopoceros cornutus*) from West Indies, purchased; six African Scorpions (*Scorpio*, sp.inc.) from South Africa, presented by Mr. J. F. Hawtayne.

OUR ASTRONOMICAL COLUMN.

PHOTOGRAPHIC MAGNITUDES OF NOVA AURIGÆ.—*Astronomical Journal*, No. 269, contains the results of Mr. J. M. Schaeberle's work with regard to the determination of the photographic magnitudes of stars, including also that of Nova Aurigæ. The method he has adopted differs from those used by former observers in that the photographic magnitude of a star for any exposure-time is expressed "as a function of the equivalent theoretical aperture which a standard star (Polaris in this case) would require to make the same impression on the plate in the same time." The particular form which the expression, as obtained from this investigation, assumes enables one, after having once adopted the photographic magnitude of the standard star, to determine the theoretical photographic magnitude of any other star without any reference at all to the visual magnitude. As this method had only been applied to bright stars, the appearance of Nova Aurigæ suggested a further trial for stars of less magnitude which were visible only in large instruments. On the plates, which were each night exposed, three stars in the region of the Nova, the images of which resembled somewhat that of the Nova in form, size, and density, were selected for the sake of comparison. The magnitudes of these comparison stars were then determined by direct measurement of their images on the standard positive plate, this plate being a second positive from the original negative. The resulting photographic magnitudes for the month of February showed that the light of this new star fluctuated very considerably, confirming the visual observations.

The following list gives the theoretical magnitudes as obtained in this way, the mean time at Mount Hamilton being also added. The exposures up to March 10 were all moderately short, varying from 2 to 128 seconds.

Date 1892.	Mt. Hamilton M.T.	Mag.	Date 1892.	Mt. Hamilton M.T.	Mag.
	h. m.			h. m.	
Feb. 6	12 30	4·63	Mar. 2	10 45	5·20
8	7 20	4·54	3	9 10	5·09
9	9 40	4·67	4	8 25	5·63
10	10 7	4·77	6	9 15	5·40
11	8 55	4·4	7	9 40	5·90
12	7 20	4·5	8	9 10	6·09
13	9 20	4·3	9	8 55	6·16
14	7 40	4·03	10	8 ±	7·10
15	6 15	5·22	11	8 ±	7·70
21	10 10	4·96	13	8 24	7·70
22	9 30	5·12	15	11 9	8·45
24	7 ±	4·84	16	8 35	8·60
25	8 55	4·90	20	8 56	9·25
26	9 50	5·04	21	8 50	9·40
27	8 20	4·75	22	9 17	9·55
28	8 50	4·98	24	9 2	9·80
			25	9 10	10·00

COMPARISON STARS OF THE PLANET VICTORIA.—Dr. Gill, in *Astronomische Nachrichten*, Nos. 3107-08, communicates an article on the definite places of the stars used for comparison with the planet Victoria in the observations for parallax made in the year 1889. The positions of these stars are now, as he says, "more accurately known than those of any other group of stars in the heavens," and he suggests that they should be advantageously used for the determination of optical distortion and scale values of photographic telescopes, and for testing the various methods for the "raccordement des plaques." The positions of the thirty-seven stars are based on 3766 meridian observations of right ascension, and 3771 meridian observations of declination, together with several other observations made with the heliometers at the Cape, Yale, and Göttingen, amounting to 1867 measurements of distances, and 151 position angles. In the first tables which Dr. Gill here gives, are shown the definite places for the Victorian comparison stars computed for the Equinox 1889·90, and Epoch 1889·55. Owing to the comparatively large quantities that the probable errors of the proper motions amount to, Dr. Gill mentions that it is desirable to obtain photographs for determining scale-value distortion, &c., as soon as possible. Table 2 consists of a comparison between the distances as obtained from definite co-ordinates, and these as measured by Gill, Finlay, Jacoby, Chase, Schur, and Ambronn with the heliometer.

INTERNATIONAL TIME.—In a small pamphlet, published by Mr. Edward Stanford, a scheme for a systematic regulation of time is discussed by Major the Hon. E. Noel. The principle on which the system he proposes is based is the same as that which is at present in use on the American continent. It consists in dividing the earth's surface up into time-zones each covering fifteen degrees, so that they will differ from one another by one hour. In considering the question of the initial-time meridian, there are many points which have to be well borne in mind. In the first instance there must be a first-class observatory, on which every one could depend; secondly, the contra-meridian, *i.e.*, that half of the initial meridian in the opposite hemisphere, must fall in a convenient place, by which is meant that it must not cut through a continent or any large tract of land. Another important consideration is the arrangement of the time-zones, which must, if possible, be conveniently related to the longitude boundaries as are shown in our maps. Taking these points into account, Major Noel retains Greenwich as the initial for longitude, but selects Rome as our initial for time. On this basis he discusses this scheme with reference to each individual country. The only great country which this arrangement would not suit is France, for she, as is well known, keeps Paris time; a suggestion put forward here is that France should form a special zone, making her time exactly, instead of approximately, forty minutes after Rome. The folding diagram which accompanies this pamphlet shows a map of the world graduated on this system. From this one sees that the meridian of Rome traverses the centre of the Scandinavian Peninsula, coincides with Copenhagen, passes close to Leipzig, and between Berlin and Munich, while it cuts Italy from north to south. The western boundary of this zone, which is exactly on the fifth meridian west of Greenwich, passes between Italy and Spain, outside the western frontier of Germany, and skirts the west coast of Norway, while the eastern boundary also traverses convenient points for such a division of time. In considering the scheme as a whole, there is much to be said in its favour; but as such a question as this deals with so many nations, its development and final adoption cannot take place in a trice, but can only be brought to a head after many years' deliberation and debate.

COMET SWIFT (MARCH 6, 1892).—The ephemeris of Comet Swift is given in *Edinburgh Circular*, No. 29, and has been computed from elliptic elements supplied by Herr Berberich. This comet in large telescopes is quite a conspicuous object, while in smaller ones it is still visible. The following ephemeris we take from the above-mentioned source:—

Ephemeris for Berlin Midnight.

1892.	R.A.	Decl.	Log Δ.	Log *r*.	Br.
	h. m. s.	° ′			
Aug. 31	0 42 35	+52 42·6			
Sept. 1	41 24	38·3			
,, 2	40 10	33·6	0·2693	0·3922	0·081
,, 3	38 55	28·5			
,, 4	37 39	22·9			
,, 5	36 22	16·9			
,, 6	35 4	10·5	0·2720	0·4004	0·077
,, 7	0 33 46	52 3·7			

Taking the comet's position for September 2, we find that it will lie very nearly 3½° south of α Cassiopeiæ, being in the prolongation of a line joining the stars λ and ζ of the same constellation.